Economic Cooking adapted to Persons of Moderate and Small Means;' first prize to be $500; second prize, $200. All essays written for the above prizes must be in the hands of the secretary, Dr. Irving A. Watson, Concord, N.H., on or before Oct. 15, 1888.

— Dr. William Noyes contributes to the *Journal of Social Science* (No. xxiv.) a convenient summary of the modern view of the criminal type. Taking Lombroso as his guide, he shows in how very many respects the criminal presents abnormal differences, both physical and psychic, from his fellow-men. These differences are to a large extent indicative of a reversal to a more primitive, savage type. It is hopeful to add, that many of the peculiarities can be detected in children, and that the evil results which they forebode can be to a large extent prevented by a properly directed education.

— At the March meeting of the Society of Medical Jurisprudence and State Medicine of New York the best method of executing criminals was discussed. Dr. William A. Hammond advocated strangulation by a silk or cotton rope as the most satisfactory method at command. He criticised the recent report of the State Commission, which recommended the use of electricity, and said that the objections raised against the present method of execution would apply with equal force to any form of execution. Several of the members took exception to Dr. Hammond's statement that strangulation was painless, and Drs. Spitzka and Brill spoke in favor of the guillotine. The society finally adopted, by a nearly unanimous vote, a resolution condemning the bill now before the Legislature, which embodies the recommendations of the State Commission referred to, an abstract of which has already been given in *Science*.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Twenty copies of the number containing his communication will be furnished free to any correspondent on request.

The editor will be glad to publish any queries consonant with the character of the journal.

Experiments in Vision Again.

SOME time since in *Science* (No. 262) we referred to an experiment which we thought indicated an interesting connection between monocular and binocular vision. We have another to present here which seems in our own experience to possess a similar importance. It is perhaps even more forcible than the first, and may be worth the attention of those interested in visual phenomena.

Take two circles as represented in Fig. 1, and either bend the sheet of paper in the median plane, so that the circles can be made to appear in inclined planes at any desirable angle, or cut the paper so that they may be held at a suitable inclination to each other in planes that will intersect at any given point. The larger the circles, the better will be the effect, the more clearly marked will be the results we have to describe. Now, if we incline the planes of the circles several degrees, it is well known that the retinal impression becomes ovular or elliptical; and the circles also will appear more or less so, when we make allowance for the judgments of experience which can recognize a real circle, although the impression is not identical with it in form. If, then, we combine the circles by convergence at this slight inclination, the central and fused image will retain its slightly elliptical form, although the surface upon which it appears seems a plane vertical to the median plane. The real inclination of the two surfaces does not appear to determine any irregularities in the effect; but binocular agencies, perhaps, balance the two opposing influences from monocular vision so as to present the appearance of a plane. But if we increase the inclination of the two circles and their planes, say each of them to 45° from the horizontal meridian, and cutting the median plane so as to form a right angle with each other, and then combine them by convergence, the effect may be entirely changed. We find that rivalry may take place between the monocular images, and that there is a tendency to see only one of the images at a time, of those belonging to corresponding points. Not only does the circle appear elliptical, but its plane appears in its real inclination to the median plane; that is, the circle seems to lie in the third dimension, with one side nearer the observer than the other, precisely as it ought to appear in case that vision presents the real relations in space of its objects. This effect may alternate from one inclination to the other, showing that there is rivalry between the monocular images for expression in the field of vision. Fatigue may cause this alternation. But the interesting fact to be noted is, that binocular influences no longer avail to make the plane of the fused images lie in plane of the horizontal meridian. The circle seems inclined to this, and is seen in its real space relations, corresponding exactly to the innervation for the individual eye which sees it. If we may ever speak of monocular influences suppressing those of binocular action, we may do so in such cases as these.

We have been able also to obtain more complicated results of the same general kind. This we accomplished by the use of stereoscopic figures, as in Fig. 2. The experiment is performed as before.

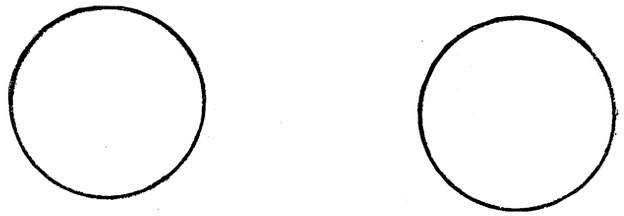


FIG. 1.

If placed at the proper inclination, and combined by convergence, we may notice the inclination of both circles; that is, the monocular images of one concentric set. The same alternation can be observed as before. But by careful practice we have been able to notice the larger circle inclined in one way to the median plane, and the smaller in the opposite way. This makes the planes of the larger and smaller circles of the apparently fused image appear to cut each other at an angle instead of lying in the same plane. This can be explained by supposing that the monocular image of one circle is seen by the right eye, and the monocular image of the other by the left eye. And as each appears to be in the plane in which it really exists, the two must appear to cut each other at an angle. Various alternations may be observed, besides those mentioned in Fig. 1; but they are due merely to the larger number of circles and the different possible relations represented. The results are especially interesting as calling attention to and illustrating the fact that *binocular* disparate points in their visual activity functionate precisely as *monocular* disparate points. This is simply another way of expressing the phenomena of rivalry; for we observe in these, that one area of the right eye may be acting in one way while the corresponding area of the left is inactive, and a disparate area of the left may be acting in another way while the corresponding area in the right is inactive: hence the functional activity of one eye in regard to the larger circle will not prevent the action of the other eye in regard to the smaller circle of Fig. 2. In this case the suppression of one of the binocular images in each case would leave the visual process entirely to monocular functions; and hence, when the inclination of the real planes is great enough to be noticed, it is quite possible that the effect would represent the two circles in different planes cutting each other. It has required much practice, however, to get the results we have described, as the easier tendency, when any inclination of the circles is observed at all, is to per-

FIG. 2.

ceive them both in the same plane, representing the experiment of Fig. 1, only with a greater number of circles. It is quite possible that very many experimenters cannot obtain the effect at all. In our own case we are much aided by the readiness with which the innervation of each eye can be carried on independently of the other. In fact, the phenomenon may be peculiar to our own experience alone, and may not be capable of verification by others. We shall be glad to know if it can be verified. J. H. HYSLOP.

Baltimore, Md., April 26.

Is the Rainfall increasing on the Plains?

I NOTICE a letter from Mr. Curtis in *Science* of April 20, calling attention to an error in the accepted Fort Leavenworth precipitation, due to the reckoning of snow (unmelted) as rain. I have looked up Schott's original manuscript, and find the large precipitation in January, 1871, entered "11.25″?" showing that the compiler was aware of a possible error. A careful examination of the original record shows that the true value is 1.20 for January, and 46.70 for the year. For 1872 the amount should be 51.65. I am inclined to think that Mr. Curtis is altogether too sweeping in his criticism. The probability of such an error having crept into the bulk of the Fort Leavenworth records is exceedingly small; and, moreover, the records nearly all the way through are partially checked by parallel records at neighboring stations.

It is certainly true, that, "if such errors as these exist in the records, it is surprising to find that the rainfall of Kansas is increasing." In this quotation from the letter, I have omitted a 'not' before 'surprising.' The reason is plain. Since 1873 the Fort Leavenworth records are not quoted, but only those of the Signal Service. Now, it is recognized that the exposure of the latter gauge will give too little rainfall; and, moreover, the measurement of melted snow is invariably too small. Both of these causes combine to render the records too small since 1873; and, if we assume that before then the records averaged five to ten inches too great, it is easy to see that there has been an enormous increase in rainfall, if the last fifteen years average more than the previous fifteen.

I wish to call attention to an exceedingly interesting point in this connection. During the last four years, Dr. Carpenter, at West Leavenworth, has reported from five to twenty-five inches more rain each year than the Signal Service two miles due east. Will not some scientist residing near Leavenworth take a special interest, and determine the possibility of such a large increase in precipitation in so short a distance? This will also have a most important bearing on the rainfall question. H. A. HAZEN.

Washington, D.C., April 21.

Chloride of Nitrogen.

IT seems to me worth while to call attention to the fact that the preparation of chloride of nitrogen by the electrolysis of a solution of ammonium chloride, announced in your last issue (p. 206) as a new discovery, has, as a matter of fact, long been known. This method of preparation forms, indeed, one of the stock lecture-experiments in many courses in chemistry. Incidentally it may be noted that within the last few weeks chloride of nitrogen has been made in considerable quantity in Göttingen by Dr. L. Gattermann, who has also for the first time made careful analyses of the substance. The difficulty involved in such an investigation will be appreciated to some extent when it is borne in mind that chloride of nitrogen is probably the most explosive chemical compound known. Dr. Gattermann's investigation has been spoken of in German newspapers as an act of heroism. IRA REMSEN.

Baltimore, April 28.

Christmas Customs in Newfoundland.

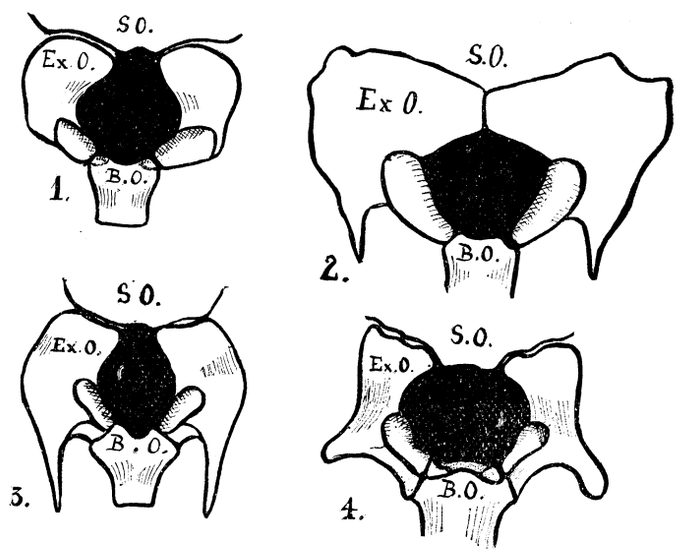
IN *Science* for Feb. 24, 1888, it is said, in the note on 'Christmas Customs in Newfoundland,' that the practice there described of tying a wren to a bush, and singing the rhymes there given, is not known in other places. It may interest your readers to know that fifteen years ago certainly, and probably at the present time, the country boys in County Clare and County Limerick, Ireland, if not in other counties, never let St. Stephen's Day pass without bringing round from house to house a bush adorned with ribbons, with on the top a struggling wren, or, if not a wren, some small bird for that day dignified by the name. The rhymes sung during the cruel ceremony were, I think, identical with those given in your paper. And in some way or other the coppers which the youths pocketed — given them at the houses they visited, whether on condition of releasing the wren or not — were supposed to do honor to the dying bird. W. F. STOCKLEY.

Fredericton, Canada, April 19.

Osteological Notes.

IT is often extremely difficult to determine with accuracy the boundaries of the four centres of ossification which characterize the occipital segment of the cranium in the various orders of the mammalia. The tendency to early co-ossification of these separate centres or bones, as they are generally described by anatomists, is for the most part so great, that it is impossible to obtain the information desired without the aid afforded by the collections of large museums; and, even with this advantage, perfect accuracy of description is scarcely possible in many cases, on account of the lack of material.

As a general rule, with notable exceptions, however, the four bones — viz., the supra-occipital, two ex-occipitals, and basi-occipital — individually contribute, in a greater or less degree, to the formation of the *foramen magnum*, the amount thus contributed by each depending very much upon the shape assumed by that opening (compare Figs. 1 and 4).



In both the odd-hoofed and pair-hoofed animals (*Ungulata*), in the elephants (*Proboscidia*), dugong and manatee (*Sirenia*), in the pangolins (*Edentata*), and in the opossum (*Marsupialia*), the ex-occipitals meet above, and thus shut out entirely the supra-occipital from participation in the margin of the foramen (Fig. 2).

In the remaining orders it may be said that the supra-occipital contributes from a third to a fourth of the border of the great opening, the lines of suture between this bone and the ex-occipitals running slightly upward and outward to a point corresponding with the level of the zygomatic process of the squamosal.

The ex-occipitals, with few exceptions, as in the dog (*Carnivora*) and in the armadillos (*Edentata*), supply the greater portion of the condyloid surface, the remainder being furnished by the basi-occipital.

The lines of suture which mark the separation of these two segments should be drawn from the margin of the *foramen magnum* downwards and outwards, bisecting the inner third of the condyle, to a point corresponding with the centre of the tympanic or auditory bulla (Fig. 4). In the cases where the condyles are the product of the ex-occipitals alone, as in the dog, the lines of separation must be drawn in the same general direction, but not so as to include any of the condyloid surface (Fig. 3). D. D. SLADE.

Museum of Comparative Zoölogy, Cambridge, Mass., March 30.